

If expected reinforcement steel is missing, or a pattern differing from that shown on the existing Contract Documents is uncovered, then the Office of Bridge Development shall be contacted for evaluation.

Where dowel bars are required to tie new concrete into an existing structure, they shall be installed in conformance with 406.03.

**421.03.08 Substitution.** Substitution of different size bars will be permitted only when approved by the Engineer. No additional compensation will be allowed for substituting larger size bars in lieu of the bars specified.

**421.04 MEASUREMENT AND PAYMENT.** The payment will be full compensation for cleaning, coating, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

**421.04.01** Reinforcement steel bars or epoxy coated reinforcement steel bars will not be measured but the cost will be incidental to other pertinent items specified unless an item for reinforcement steel bars appears in the Contract Documents.

**421.04.02** Reinforcement Steel Bars or Epoxy Coated Reinforcement Steel Bars will not be measured but will be paid for at the pertinent Contract lump sum price.

**421.04.03** Reinforcement Steel Bars or Epoxy Coated Reinforcement Steel Bars will be measured and paid for at the Contract unit price per pound based on the original approved overall lengths of bars computed on the basis of the nominal unit weight per linear foot.

**421.04.04** Incorporating existing reinforcing steel in the final structure including straightening, bending, splicing, and removal and replacement will not be measured but the cost will be included in the pertinent Concrete item.

**SECTION 422 — DAMPPROOFING AND  
MEMBRANE WATERPROOFING**

**422.01 DESCRIPTION.** This work shall consist of dampproofing and waterproofing of concrete surfaces.

**422.02 MATERIALS.**

Asphaltic Materials	913.01
Asphalt Primer	913.02

Fabric for Use with Asphalt	913.03
Membrane Waterproofing and Dampproofing	913.04

**422.03 CONSTRUCTION.** Dampproofing and waterproofing shall be applied using asphaltic materials, primers and fabric, or by the roll or sheet method specified in 422.03.07.

**422.03.01 Storage.** Waterproofing fabrics and membranes shall be stored in a dry protected place. Asphalt materials in containers shall be kept closed when not in use.

**422.03.02 Surface Preparation.** Dampproofing or membrane waterproofing shall not be applied until curing has been completed and surfaces are protected against cold. All surfaces shall be dry, smooth, and free from projections and holes.

When dampproofing and membrane waterproofing are both specified for application, the membrane waterproofing shall be applied first. Dampproofing or membrane waterproofing shall not be permitted when the temperature is less than 40 F.

**422.03.03 Dampproofing.** When asphaltic coatings are used for dampproofing, they shall consist of two prime coats and one seal coat. Dampproofing shall be applied to the following concrete surfaces that will be in contact with backfill.

- (a) Rear face of abutments and abutment wing wall stems.
- (b) Rear faces of headwalls and wing walls for pipes 36 in. in diameter or larger and for culverts.
- (c) Rear face of retaining wall stems.
- (d) The following areas pertain to reinforced concrete box culverts:
  - (1) Top of top slabs when not built to grade.
  - (2) Entire outside surfaces of side walls.
  - (3) Additionally, bottom of bottom slabs of precast units.

**422.03.04 Waterproofing.** When asphaltic coatings are used for waterproofing, they shall consist of a prime coat, three mop coats, and two layers of fabric.

Waterproofing shall be applied to all construction joints of a concrete structure that are next to backfill above normal water surface with backfill

on one side and atmosphere on the other side. It shall be applied with a minimum width of 16 in. centered on the joint.

**422.03.05 Application of Dampproofing.** Care shall be taken to confine all coatings to the areas to be covered to prevent coating of parts of the structure that will be exposed to view in the completed structure. Dampproofing shall be applied to the full face of all contraction joints.

The dampproofing material shall be applied in conformance with the manufacturer's recommendations. When no recommendations are provided, the dampproofing material shall be applied to the cured, cleaned, and dry surfaces as follows:

- (a) Paint with two coats of primer for absorptive treatment at a rate of  $1/8$  gal/yd<sup>2</sup> per coat. The second coat shall not be applied until the first coat has thoroughly dried. The material shall not be heated.
- (b) After the second prime coat has thoroughly dried, one seal coat shall be applied by brush or roller at a rate of  $1/8$  gal/yd<sup>2</sup>. When necessary, this material may be heated, but not in excess of 150 F.

**422.03.06 Application of Membrane Waterproofing.** When membrane waterproofing is applied, the cured, cleaned and dry surfaces shall be coated with a prime coat and covered with mop coats and layers of fabric.

**Coating Procedure.** The surfaces shall first be coated with a primer at a rate of  $1/8$  gal/yd<sup>2</sup>. The prime coat shall be applied 24 hours in advance of applying any mop coats and shall be dry before the first mopping is applied. The primer shall not be heated.

Asphalt for mop coats shall be heated to a temperature between 300 and 350 F, with frequent stirring to avoid local overheating. The heating kettles shall be equipped with thermometers.

The waterproofing shall begin at the low point of the surface to be waterproofed, so that water will run over and not against or along the laps.

The first strip of fabric shall be half width. The second shall be full width, lapped the full width of the first sheet. The third and each succeeding strip thereafter shall be full width and lapped so that there will be two layers of fabric at all points and three layers with laps not less than 2 in. wide at edges of strips. All laps at ends of strips shall be 12 in. wide.

Beginning at the low point of the surface to be waterproofed, a section 20 in. wide and the full length of the surface shall be mopped with the hot asphalt. Immediately following the mopping, the first strip of fabric shall be pressed into place eliminating all air bubbles. This strip and an adjacent section of the surface of a width equal to slightly more than half the width of the fabric being used shall then be mopped with hot asphalt and a full strip and a full width of the fabric shall be pressed into place as before. The forward or upgrade half of this second strip and an adjacent section of the concrete surface shall then be mopped with hot asphalt and the third strip of fabric shingled on so as to lap the first strip not less than 2 in. This process shall be continued until the entire surface is covered. The entire surface shall then be given a final mopping of hot asphalt. There shall be a complete coating of asphalt between all layers of fabric.

In all cases, the mopping on concrete shall cover the surface so that no gray spots appear, and on cloth it shall be sufficiently heavy to completely conceal the weave. Asphalt shall be applied at the rates of 1.2 gal/yd<sup>2</sup> on horizontal surfaces and 1.4 gal/yd<sup>2</sup> on vertical surfaces. The work shall be regulated so that at the close of a day's work, all cloth that was laid shall have received as many coatings as was required for that stage of completion. Special care shall be taken at all laps to see that the cloth is thoroughly sealed down.

**422.03.07 Roll or Sheet Waterproofing Membrane.** An alternate system of waterproofing or dampproofing consisting of rolls or sheets of membrane material may be used in lieu of the above coatings. The rolls or sheets shall be applied in conformance with the manufacturer's recommendations.

**422.03.08 Membrane Care.** At the edges of the membrane and any points where it is punctured by appurtenances such as drains or pipes, it shall be flashed in a manner acceptable to the Engineer to prevent water from getting between the waterproofing and the waterproofed surface. Damage to the membrane shall be repaired. Repairs shall extend beyond the outermost damaged portion, and the second ply shall extend at least 3 in. beyond the first.

**422.04 MEASUREMENT AND PAYMENT.** Dampproofing and membrane waterproofing will not be measured but the cost will be incidental to other pertinent items specified in the Contract Documents.